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(54) Title: 4-(1,2-BENZISOXAZOLYL)PIPERIDINE ANTIPSYCHOTIC AGENTS (57) Abstract Certain 1-substituted 4-(1,2-benzisoxazolyl)piperidine compounds exhibit neuroleptic activity and are useful in the treatment of psychosis and anxiety.		

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5 4-(1,2-BENZISOXAZOLYL)PIPERIDINE ANTIPSYCHOTIC AGENTS

Background of the Invention

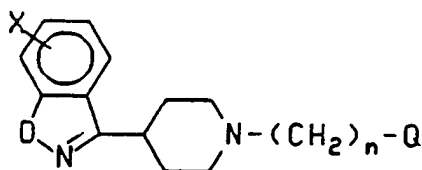
The present invention is directed to novel 1-substituted 4-(1,2-benzisoxazolyl)piperidine compounds which exhibit neuroleptic activity and are useful in the
10 treatment of psychosis and anxiety.

Other compounds useful in treating psychotic disorders are known. For example, U.S. Patents Nos. 4,558,060 and 4,831,031 describe arylpiperazinyl-ethyl or butyl heterocyclic compounds and their use in the treatment of psychiatric
15 disorders. European Patent Application 0196132 teaches 1,2-benzisoxazol-3-yl and 1,2-benzisothiazol-3-yl derivatives useful in treating psychiatric disorders.

Although the above compounds have been discovered, there is a continual search in this field of art for other
20 more effective compounds.

Summary of the Invention

This invention is directed to 1-substituted 4-(1,2-Benzisoxazolyl)piperidine compounds that are useful in the treatment of psychosis and anxiety. The compounds of this
25 invention have the formula



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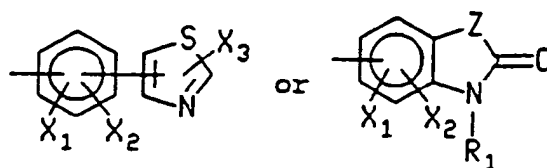
Formula I

and the pharmaceutically acceptable base salts thereof;
wherein

X is H, halo, C₁-C₄ alkyl, C₁-C₄ alkoxy or CF₃;

35 n is 2, 3 or 4; and

Q is



wherein Z is CR_2R_3 , $CR_2R_3CR_4R_5$, $CR_2R_3CR_4R_5CR_6R_7$, O or S; R_1 , R_2 , R_3 , R_4 , R_5 , R_6 and R_7 are H, or C_1 - C_4 alkyl; X_1 and X_2 are H or halo; and X_3 is H, C_1 - C_4 alkyl, C_1 - C_4 alkoxy or CF_3 . Solvates (e.g. hydrates) of the above compounds are also included within the scope of the definition of formula I.

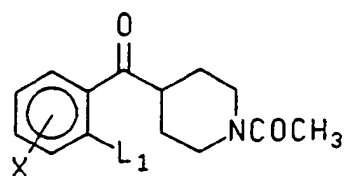
Particularly preferred compounds are compounds of formula I wherein Z is CR_2R_3 or $CR_2R_3CR_4R_5$. Preferred within this group are compounds where n is 2 and X is H or halo. Preferred within this group are compounds where X is halo, X_1 and X_2 are H, and R_1 , R_2 , R_3 , R_4 and R_5 are H or methyl.

A second preferred group of compounds of formula I are those wherein Q is phenyl substituted with thiazolyl, said thiazolyl substituted with X_3 . Preferred within this group are compounds wherein n is 4 and X is H, halo, or C_1 - C_4 alkyl. The term "halo" refers to F, Cl or Br. A preferred compound within this group is 1-(4-(4-(2-methylthiazol-4-yl)phenyl)butyl)-4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidine.

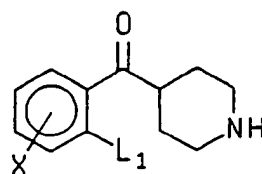
Other preferred compounds are 5-(2-(4-(6-Fluoro-1,2-benzisoxazol-3-yl)-1-piperidinyl)ethyloxindole, 1,3-dimethyl-5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)-piperidinylethyl)oxindole, 3,3-dimethyl-5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)-piperidinyl)ethyl)oxindole, or 6-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidinyl)ethyl)-1,2,3,4-tetrahydro-2(1H)-quinolinone.

The present invention is also directed to pharmaceutical compositions for the treatment or prevention of psychosis and anxiety, which comprises a compound of the formula I and in a pharmaceutically acceptable carrier; and to a method for the treatment or prevention of psychosis or anxiety which comprises administering to a person in need of such treatment or prevention a compound of the formula I in an amount effective to treat or prevent psychosis or anxiety.

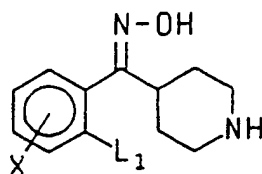
Other features and advantages will be apparent from the specification and claims.

Detailed Description of the Invention

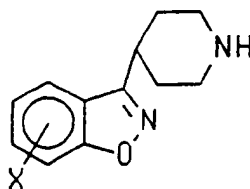
II



III



IV

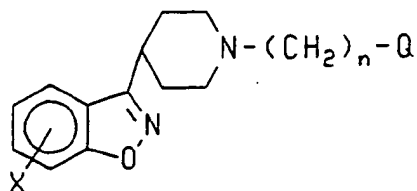


V

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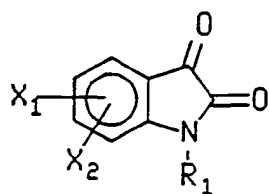
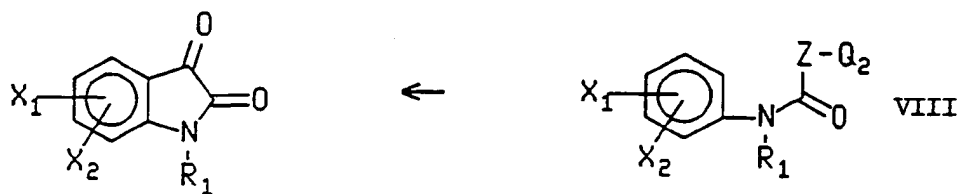
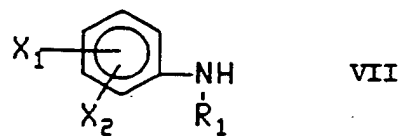
 $L-(CH_2)_n-Q$

VI

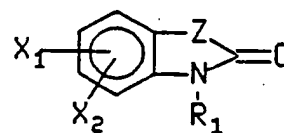
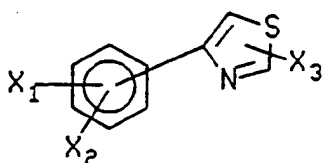


I

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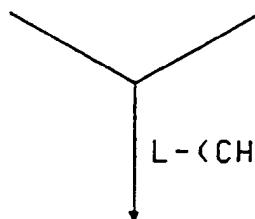
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IXA

IXB

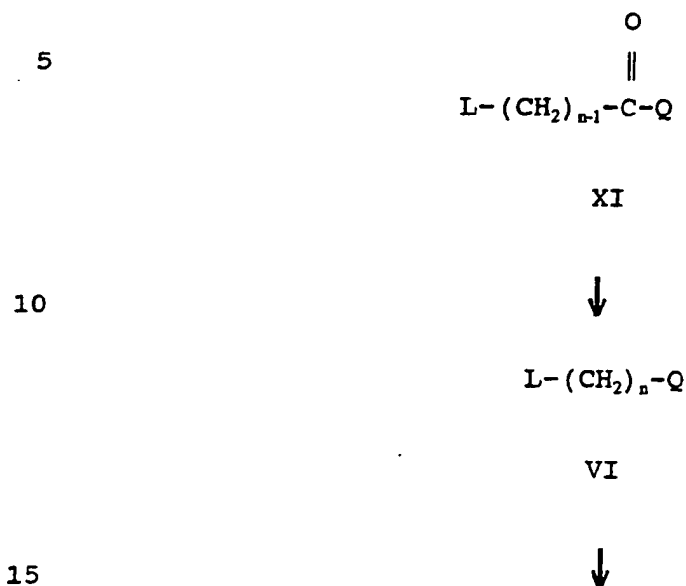
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Compounds of the formula I wherein X, n, Q, Z, X₁, X₂, R₁, R₂, R₃, R₄, R₅, R₆ and R₇ are as defined above may be prepared by reacting the appropriate formula V compounds wherein X is as defined above with the appropriate compounds of formula VI wherein X, n, Q, Z, X₁, X₂, X₃, R₁, R₂, R₃, R₄, R₅, R₆ and R₇ are as defined above and L is a halogen (e.g. F, Br, Cl, I) or other suitable leaving group (e.g. CH₃SO₃, p-toluenesulfonyloxy).

The reaction is generally performed in a polar solvent such as a lower alcohol, dimethylformamide, dimethylacetamide, acetonitrile, or methyl isobutyl ketone, and in the presence of a weak tertiary base such as triethylamine or an inorganic base such as sodium or potassium carbonate. A catalytic amount of sodium or potassium iodide may be employed to further the degree of completion. The reaction may be conducted at a temperature within the range of about

0°C to about 250°C, and preferably it is conducted at the reflux temperature (boiling point) of the chosen solvent.

The formula V compounds wherein X is as defined above may be made by a modification of a procedure disclosed in
5 European Patent Application publication no. 0196132 described by Kennis et al. Generally a formula IV compound wherein X is as defined above and L₁ is a halogen or suitable leaving group is cyclized under basic conditions (e.g. 50% aqueous NaOH) at elevated temperatures of about 30°C to
10 about 100°C and preferably at reflux.

The compounds of formula IV wherein X and L₁ are as described above may be made by reaction of the appropriate formula III compound wherein X and L₁ are as defined above with hydroxylamine hydrochloride and a base such as triethylamine or pyridine, in an inert solvent (e.g., a polar
15 solvent such as a lower alcohol) under reflux conditions in the absence of oxygen.

The compounds of formula III wherein X and L₁ are as described above may be made by deacetylation of the
20 appropriate formula II compound, wherein X and L₁ are as described above, by heating (e.g., at reflux) in the presence of an acid (e.g., conc. HCl) in the presence or absence of an inert solvent (e.g., acetic acid).

The compounds of formula II wherein X and L₁ are as
25 described above may be made by methods known to those skilled in the art, such as by the Friedel Crafts acylation of the appropriately substituted benzene using an N-Acetyl isonipecotoyl halide.

The compounds of formula VI wherein L, X, n, Q, Z, X₁,
30 X₂, X₃, R₁, R₂, R₃, R₄, R₅, R₆ and R₇ are as defined above may be prepared by methods available to those practicing in the art and analogous to those described in European Patent Application 0281309. Thus, compounds of the formula VI (described above) may be prepared by reducing the appropriate compound
35 of formula XI wherein L, X, n, Q, Z, X₁, X₂, X₃, R₁, R₂, R₃,

R_4 , R_5 , R_6 and R_7 are as defined above, with a reducing agent such as triethylsilane in trifluoroacetic acid.

Compounds of the formula XI wherein L, X, n, Q, Z, X_1 , X_2 , X_3 , R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , and R_7 are as defined above may be prepared by reacting the appropriate compound of the formula IXA or IXB wherein X, Z, X_1 , X_2 , X_3 , R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , and R_7 are as defined above with a haloalkanoic acid or a haloalkanoyl halide wherein the halogen is selected from the group consisting of Cl, Br and I, employing, for example, Friedel-Crafts conditions (e.g., aluminum trichloride in carbon disulfide or methylene dichloride under an inert atmosphere) or via acylation in a medium such as polyphosphoric acid at a temperature from about room temperature to about 100°C.

Formula Q compounds having the Formula IXA wherein phenyl is substituted with thiazoyl (the thiazolyl is optionally substituted with X_3 as defined above) may be made by standard methods known to those skilled in the art such as described in Preparation E and EP Application 279,548.

Compounds of the formula IXB wherein X_1 , X_2 , R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , and R_7 are as defined above and Z is CR_2R_3 , $CR_2R_3CR_4R_5$, $CR_2R_3CR_4R_5CR_6R_7$ may be made by several methods as described in the literature (e.g. U.S. Patent No. 4,831,031), and outlined above. For example, an aryl amine of formula VII wherein X_1 , X_2 and R_1 are as defined above may be converted using methods known in the art, to an arylamide of the formula VIII wherein X_1 , X_2 , R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , and R_7 are as defined above and Q_2 is a leaving group (e.g. halo) which may then be cyclized to produce a compound of the formula IXB.

Alternatively, compounds of formula VIII in which Z is C=O and Q_2 is halo (i.e., Cl or Br) may be cyclized (e.g., employing Friedel-Crafts conditions as described above) to a compound of structure XII. These compounds of formula XII may then be reduced to compounds of formula IXB (where Z = CH_2) using reduction techniques known to those skilled in the

art (e.g., by the Wolff-Kishner reduction, employing hydrazine and a strong base).

Compounds of the formula IXB wherein X_1 , X_2 , R_1 are as defined above and Z is S or O may be prepared by standard
5 methods known to those skilled in the art (e.g., U.S. Patent No. 4,831,031). In addition some are commercially available (e.g., 2-Benzoxazolinone is available from Aldrich Chem. Co.)

The pharmaceutically acceptable acid addition salts of
10 the compounds of formula I are prepared in a conventional manner by treating a solution or suspension of the free base, i.e., a compound of formula I, with about one chemical equivalent of a pharmaceutically acceptable acid. Conventional concentration and recrystallization techniques are
15 employed in isolating the salts. Such pharmaceutically acceptable acid addition salts include, but are not limited to the respective salts of acetic, malic, citric, fumaric, sulfuric, hydrochloric, hydrobromic, hydroiodic, sulfonic such as methanesulfonic and p-toluenesulfonic and related
20 acids.

The neuroleptic activity of the present compounds may be demonstrated by methods based on standard procedures. In one method, adult male Sprague-Dawley rats are pretreated with appropriate doses of the test compound by subcutaneous
25 injection. One half hour later all rats are injected intraperitoneally with 1 mg/kg apomorphine hydrochloride dissolved in an 0.1% ascorbate solution. The rats are rated behaviorally according to the following scale at 5, 15, 25, 35 and 45 minutes after the apomorphine injection: 0 =
30 alert but not moving, 1 = moving around the cage, 2 = discontinuous sniffing behavior, 3 = continuous sniffing with discontinuous oral movements, and 4 = continuous licking and chewing movements.

The neuroleptic activity of the compounds of this
35 invention makes them useful for treating psychotic disorders in human subjects. For example, these compounds are useful for treating psychotic disorders of the schizophrenic types

and in particular the compounds are useful for removing or ameliorating such symptoms as anxiety, agitation, excessive aggression, tension and social or emotional withdrawal in psychotic patients.

5 A neuroleptic compound of the formula I or a pharmaceutically-acceptable salt thereof can be administered to a human subject either alone or preferably in combination with pharmaceutically-acceptable carriers or diluents in a pharmaceutical composition according to standard pharmaceutical practice. A compound can be administered orally or
10 parenterally. Parenteral administration includes especially intravenous and intramuscular administration. Additionally, in a pharmaceutical composition comprising a compound of formula I or a pharmaceutically-acceptable salt thereof, the
15 weight ratio of active ingredient to carrier will normally be in the range from about 1:6 to about 2:1 and preferably from about 1:4 to about 1:1. However, in any given case, the ratio chosen will depend on such factors as the solubility of the active component, the dosage contemplated
20 and the precise route of administration.

For oral use of a neuroleptic agent of this invention, the compound can be administered, for example, in the form of tablets or capsules or as an aqueous solution or suspension. In the case of tablets for oral use, carriers which
25 can be used include lactose and corn starch, and lubricating agents such as magnesium stearate can be added. For oral administration in capsule form, useful diluents are lactose and dried corn starch. When aqueous suspensions are required for oral use, the active ingredient can be combined
30 with emulsifying and suspending agents. If desired, certain sweetening and/or flavoring agents can be added. For intramuscular and intravenous use, sterile solutions of the active ingredient can be prepared and the pH of the solutions should be suitably adjusted and buffered. For
35 intravenous use the total concentration of solutes should be controlled to render the preparation isotonic.

When a neuroleptic agent of this invention is to be used in a human subject to treat a psychotic disorder, the daily dosage will normally be determined by the prescribing physician. Moreover, the dosage will vary according to the age, weight and response of the individual patient as well as the severity of the patient's symptoms. However, in most instances an effective amount for treating a psychotic disorder will be a daily dosage in the range from about 3 mg to about 600 mg and preferably from about 30 mg to about 60 mg in single or divided doses, orally or parenterally. In some instances, it may be necessary to use dosages outside these limits.

The present invention is illustrated by the following examples, but is not limited to the details thereof.

15

EXAMPLE 1

5-(2-(4-(6-Fluoro-1,2-benzisoxazol-3-yl)-1-piperidinyl)ethyl)oxindole

Under N₂ a mixture of 4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidine V (2.0 g, 9.08 mmol), 5-(2-chloroethyl)-oxindole (0.95 g, 10 mmol), Na₂CO₃ (1.06 g, 10 mmol) and KI (1.0 g, 6.0 mmol) in 45 ml dry DMF was heated at 90°C for 72 hours. The reaction mixture was then poured over 150 ml ice/water, stirred, and filtered to give 3.04 g of brown solids. Chromatography on silica gel (230-400 mesh), eluting with 95% EtOAc: 5% triethylamine provided clean product, 0.645 g (19%), light brown solid, m.p. 199-204°C. Analysis for C₂₂H₂₂FN₃O₂ · 0.5H₂O: C 68.03, H 5.97, N 10.82. Found: C 67.94, H 5.57, N 10.81; MS(%): 379 (1, p⁺), 253 (4), 234 (32), 233 (100). NMR (300 MHz, CDCl₃, delta), 2.0-2.4 (m, 6H), 2.65 (m, 2H), 2.8 (m, 2H), 3.1-3.2 (m, 3H), 3.5 (s, 2H), 6.75 (d, 1H), 7.1 (m, 3H), 7.2 (s, 1H), 7.7 (m, H), 8.25 (br s, 1H).

25

30

EXAMPLES 2-5

By a similar procedure the following were also prepared:

35

2. 1,3-dimethyl-5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidinyl)ethyl)oxindole hydrochloride

35%, m.p. 104°C (dec.). Analysis for $C_{24}H_{26}FN_3O_2 \cdot HCl \cdot 1.5H_2O$: C 61.21, H 6.42, N 8.92. Found: C 61.28, H 6.40, N 8.64. MS(%): 407 (3, p⁺), 233 (100).

3. 3,3-dimethyl-5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidinyl)ethyl)oxindole hydrochloride quarter-hydrate

21%, m.p. 268°C (dec.). Analysis for $C_{24}H_{26}FN_3O_2 \cdot HCl \cdot 0.25 H_2O$: C 64.28, H 6.18, N 9.37. Found: C 64.33, H 5.79, N 9.10. MS(%): 407 (3, p⁺), 269(4), 233 (100).

4. 6-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidinyl)ethyl)-1,2,3,4-tetrahydro-2(1H)-quinolinone hemihydrate

50%, m.p. 193-195°C. Analysis for $C_{23}H_{24}FN_3O_2 \cdot 0.5H_2O$: C 68.64, H 6.26, N 10.44. Found: C 68.65, H 5.94, N 10.13; MS(%): 393 (2, p⁺), 233(100).

5. 1-(4-(4-(2-methylthiazol-4-yl)phenyl)butyl)-4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidine dihydrochloride hemihydrate

34%, m.p. 188-189°C. Analysis for $C_{26}H_{28}FN_3OS \cdot 2HCl \cdot 0.5H_2O$: C 58.75, H 5.88, N 7.91. Found: C 58.40, H 5.96, N 7.80; MS(%): 451 (6), 450 (20), 449 (52, p⁺), 311 (33), 233 (100).

PREPARATION A

4-(6-Fluoro-1,2-benzisoxazol-3-yl)piperidine hydrochloride (V)

N-Acetyl isonipecotoyl chloride (70.0 g, 0.369 mol) was added over a 20 minute period to a vigorously stirred suspension of $AlCl_3$ (98 g, 0.735 mol) in 1,3-difluorobenzene (125 ml, 1.27 mol, Aldrich Chem. Co.) at 25°C. The mixture was then refluxed, under N_2 for 4.5 hours, cooled to 25°C, and poured over 300 ml of ice/water. The layers were separated, the aqueous layer was extracted (2 x 100 ml CH_2Cl_2) and combined with the organic layer and dried with $MgSO_4$. Concentration in vacuo gave 4-(2,4-difluorobenzoyl)-1-acetylpiperidine (II) as a white solid (81 g, 82%), m.p. 94-96°C.

The preceding ketone (40 g, 0.15 mol) was added to a mixture of 125 ml concentrated HCl and 125 ml acetic acid and refluxed for 16 hours, cooled, and concentrated in vacuo. The white residue was triturated with hot isopropanol, filtered, washed with Et₂O and dried to give 32.3 g (83%) of 4-(2,4-difluorobenzoyl)-piperidine hydrochloride (III), m.p. 215-216°C.

The above material (32 g, 0.122 mol), hydroxylamine·HCl (8.5 g, 0.122 mol) and triethylamine (24.8 g, 0.224 mol) in EtOH (250 ml) was refluxed under N₂ for 4 hours, cooled and filtered to provide the oxime (IV), 27.44 g (93%), m.p. 246-252°C.

Crude IV in 300 ml of 50% aqueous NaOH was refluxed for 4 hours, cooled and extracted with toluene (3 x 100 ml). The organic extracts were washed with saturated NaCl, dried (MgSO₄) and concentrated to a yellow residue. Chromatography on silica gel (230-400 mesh) eluting with 19 CH₂Cl₂:1 CH₃OH:0.1 NH₄OH produced the title product (V), converted to its hydrochloride with HCl gas in Et₂O, 5.0 g (17%), m.p. 295°C (dec.).

PREPARATION B, C

The substituted 5-(2-chloroethyl)oxindoles used in Examples 2 and 3 were prepared in an analogous fashion to preparation D from the appropriate starting materials (i.e., 1,3-dimethyloxindole and 3,3-dimethyloxindole, respectively).

PREPARATION D

6-(2-chloroethyl)-1,2,3,4-tetrahydro-2(1H)-quinolinone

Under N₂ a mixture of chloroacetyl chloride (5.2 ml, 0.065 mol) and AlCl₃ (41.4 g, 0.31 mol) in 200 ml CS₂ was stirred mechanically while 1,2,3,4-tetrahydro-2(1H)quinolinone (7.36 g, 0.05 mol, prepared according to the method of JACS, 1944, 66, 1442) was added over a 5 minute period. The mixture was refluxed for 2 hours and another 20 ml chloroacetyl chloride was added. After a further 3 hours at reflux, the dark green reaction mixture was cooled to 25°C,

the CS₂ was decanted, and the residue was slowly decomposed by pouring slowly over 500 g ice. (NOTE: vigorous evolution of HCl!) The resulting solids were filtered, washed well with H₂O and air dried to give 10.7 g (96%) of crude
5 6-chloroacetyl-1,2,3,4-tetrahydro-2(1H)quinolinone, m.p. 215-218°C; MS(%): 233 (9, p⁺), 174 (100).

Under N₂, the above intermediate (6.71 g, 0.03 mol) in trifluoroacetic acid (23 ml, 0.3 mol) was treated dropwise with triethylsilane (11 ml, 0.069 mol) while maintaining an
10 internal temperature below 25°C. After 72 hours at 25°C the brown solution was poured over 200 ml ice/water and stirred to produce a tan solid which was further washed with water and dried to give the title product, 5.42 g (86%), m.p. 148-152°C (dec.); MS(%): 211, 209 (34, p⁺), 160(100). NMR
15 (d₆-DMSO, 300MHz, delta), 2.0-2.3 (m, 2H), 2.4-2.75 (m, 4H), 3.4 (t, 2H), 6.4 (d, 1H), 6.6-6.8 (m, 2H), 9.7 (br s, 1H).

PREPARATION E

The chlorobutyl thiazolyl substituted phenyl used in Example 5 was prepared according to the following method and
20 as described in E.P. Application 279,598.

4-Chlorobutylacetophenone: To a 250 ml round-bottomed flask were added 5.0 g (29.65 mmol) 1-chloro-4-phenylbutane and 10 ml 1,2-dichloroethane. To the stirred solution was added a solution of 4.35 g (32.62 mmol) aluminum chloride
25 and 4.22 ml (59.31 mmol) acetyl chloride in 50 ml 1,2-dichloroethane. The solution evolved HCl as it was stirred at room temperature for 1 hour. It was then poured into water, the layers separated, and the organic layer washed with 1N HCl, aqueous sodium bicarbonate solution, brine,
30 dried over sodium sulfate, and evaporated to an oil, 6.7 g (100%). NMR (delta, CDCl₃): 1.76 (m, 4H), 2.5 (s, 3H), 3.50 (m, 2H), 7.2 and 7.85 (m, 4H). IR cm⁻¹, neat): 1678 (C = O).

4-(4-Chlorobutyl)phenyl-2-methylthiazole hydrobromide: The
35 above oil was added to a 100 ml round-bottomed flask equipped with N₂ inlet along with 15 ml acetic acid. Bromine

(1.53 ml, 29.65 mmol) was added dropwise and the solution stirred at room temperature for 15 minutes (decolorizes in about 7 minutes). The solution was taken up in ethyl acetate (careful - the bromide is a potent lachrymator), washed with water, aqueous sodium bicarbonate solution, brine, dried over sodium sulfate, and evaporated to an oil, 8.9 g (about 100% yield).

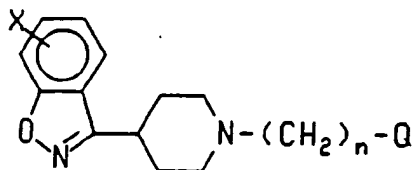
The oil was dissolved in 70 ml acetone, treated with 2.23 g (29.65 mmol) thioacetamide (which gives a precipitate, which, however, is not product) and refluxed 15 hours. The reaction was cooled, evaporated to 10 ml volume to afford a precipitate, filtered, the precipitate washed with 10 ml acetone, then washed thoroughly with ether and dried to a white solid, mp 128-129°C, 6.8 g (66.2%). NMR (delta, DMSO-d₆): 1.85 (m, 4H), 2.5 (m, 2H), 2.77 (s, 3H), 3.5 (m, 2H), 7.2 and 7.8 (m, 4H), 7.92 (s, 1H). IR (cm⁻¹, DMSO): 1620. MS (%): 265/267 (parent, 7.5/3.7), 189 (17), 188 (100), 147 (39), 115 (11), 82 (10).

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CLAIMS

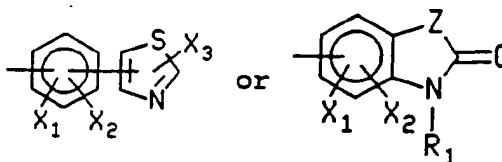
1. A 4-(1,2-Benzisoxazolyl)piperidine compound of the formula

10



Formula I

and the pharmaceutically acceptable base salts thereof
 15 wherein X is H, halo, C₁-C₄ alkyl, C₁-C₄ alkoxy or CF₃;
 n is 2, 3 or 4; and
 Q is



wherein Z is CR₂R₃, CR₂R₃CR₄R₅, CR₂R₃CR₄R₅CR₆R₇, O or S; R₁, R₂, R₃,
 20 R₄, R₅, R₆ and R₇ are H or C₁-C₄ alkyl; X₁ and X₂ are H or halo;
 and X₃ is H, C₁-C₄ alkyl, C₁-C₄ alkoxy or CF₃.

2. A compound according to claim 1 wherein Z is CR₂R₃ or CR₂R₃CR₄R₅.

3. A compound according to claim 2 wherein n is 2 and
 25 X is H or halo.

4. A compound according to claim 3 wherein X is halo, X₁ and X₂ are H, and R₁, R₂, R₃, R₄ and R₅ are H or methyl.

5. A compound according to claim 1 said compound being 5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)-1-piperi-
 30 danyl)ethyl)oxindole, 1,3-dimethyl-5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)-1-piperidiny)ethyl)oxindole, 3,3-dimethyl-5-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)-1-piperidiny)ethyl)oxindole, or 6-(2-(4-(6-fluoro-1,2-benzisoxazol-3-yl)-1-piperidiny)ethyl)-1,2,3,4-tetrahydro-2(1H)-quinoli-
 35 none.

6. A compound according to claim 1 wherein Q is phenyl substituted with thiazolyl, said thiazolyl substituted with X_3 .

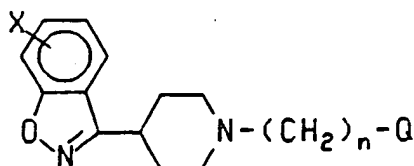
7. A compound according to claim 6 wherein n is 4 and X_3 is H, or C_1 - C_4 alkyl.

8. A compound according to claim 7 said compound being 1-(4-(4-(2-methylthiazol-4-yl)phenyl)butyl)-4-(6-fluoro-1,2-benzisoxazol-3-yl)piperidine.

9. A pharmaceutical composition for the treatment or prevention of psychosis and anxiety, which comprises a compound according to claim 1 in a pharmaceutically acceptable carrier.

10. A method for the treatment or prevention of psychosis or anxiety, comprising administering to a person in need of said treatment or prevention a compound according to claim 1 in an amount effective to treat or prevent psychosis or anxiety.

11. A process for preparing a 4-(1,2-benzisoxazolyl)-piperidine compound of the formula

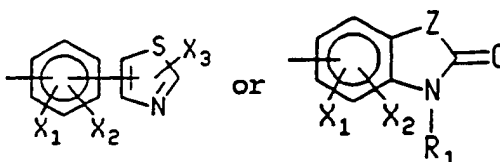


Formula I

and the pharmaceutically acceptable base salts thereof wherein X is H, halo, C_1 - C_4 alkyl, C_1 - C_4 alkoxy or CF_3 ;

n is 2, 3 or 4; and

Q is

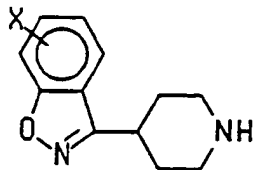


wherein Z is CR_2R_3 , $CR_2R_3CR_4R_5$, $CR_2R_3CR_4R_5CR_6R_7$, O or S; R_1 , R_2 , R_3 , R_4 , R_5 , R_6 and R_7 are H or C_1 - C_4 alkyl; and X_1 and X_2 are H

-17-

or halo; and X_3 is H, C_1-C_4 alkyl, C_1-C_4 alkoxy or CF_3 , which comprises reacting a compound of the formula V

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V

where X is as defined, with a base, a catalytic amount
10 of an alkali metal salt and a compound of the formula VI



VI

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in a polar solvent, where n and Q are as defined and L is a halo or other suitable leaving group, until the reaction is substantially complete.

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 91/05593

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: C 07 D 413/14, 417/14, A 61 K 31/445		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	C 07 D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category *	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	EP, A1, 0079564 (HOECHST-ROUSSEL PHARMACEUTICALS INCORPORATED) 25 May 1983, see the whole document --	1-9, 11
X	EP, A2, 0196132 (JANSSEN PHARMACEUTICA N.V.) 1 October 1986, see the whole document -- -----	1-9, 11
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"G" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
11th December 1991		13 JAN 1992
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		MISS T. TAZELAAR

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☒ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☒ Claim numbers 10, because it s relate to subject matter not required to be searched by this Authority, namely:

Methods for treatment of the human or animal body by surgery or therapy, as well as diagnostic methods (see PCT Rule 39(iv)).

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the the claims. It is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/US 91/05593

SA 51029

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 31/10/91
The European Patent office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0079564	25/05/83	AU-B- 556307	30/10/86
		AU-D- 9039182	19/05/83
		CA-A- 1196334	05/11/85
		JP-A- 58090583	30/05/83
		US-A- 4352811	05/10/82
EP-A2- 0196132	01/10/86	AU-B- 579232	17/11/88
		AU-D- 5529786	02/10/86
		CA-A- 1256867	04/07/89
		JP-A- 61221186	01/10/86
		SU-A- 1468419	23/03/89
		US-A- 4804663	14/02/89

For more details about this annex : see Official Journal of the European patent Office, No. 12/82

EPO FORM P0478